

Cause and Effect Diagram

When utilizing a team approach to problem solving, there are many different opinions as to a problem's root cause. One way to capture these different ideas and stimulate the team's brainstorming on root causes is the cause and effect diagram. The cause and effect diagram is also called the Ishikawa diagram (after its creator, Kaoru Ishikawa of Japan), or the fishbone diagram (due to its shape). It is one of the seven basic quality tools used and accepted worldwide. This particular diagram is one of the tools that can easily be used by someone just starting process improvement. The cause and effect diagram describes the relationship between variables. This diagram is useful in a group setting and for situations in which little quantitative data is available for analysis. From this diagram, the user can define the most likely causes of a result. The undesirable outcome is shown as the effect, and related causes are shown as leading to, or potentially leading to, the said effect.

To construct a cause and effect diagram, start with stating the problem in the form of a "why" question. The "why" question will help during brainstorming, as each root cause idea should answer the "why" question. The team should agree on the statement of the problem (effect) and then place this question in a box at the "head" of the fishbone. (See Figure 1)

The rest of the fishbone then consists of one line drawn across the page, attached to the problem statement (effect), and several lines, or bones, coming out vertically from the main line. These branches are labeled with different categories. (See Figure 1) The categories that you use are up to you and your team. There are a few standard choices:

Service Industries: Policies, Procedures, People, Plant/Technology

Manufacturing Industries: Machines, Methods Materials, Measurements, Environment, and Manpower

You should feel free to modify the categories for your particular project and subject matter.

Once you have the branches labeled, begin brainstorming possible causes and attach them to the appropriate branches. For each cause identified, continue to ask "why does that happen?" and attach that information as another bone of the category branch. This will help you to get to the true drivers of a problem. In depth analysis of each cause can eliminate the causes one by one, and the most probable root cause can be selected for corrective action. Quantitative information can also be used to prioritize means for improvement.

This type of diagram is useful in any analysis, as it illustrates the relationship between cause and effect in rational manner. However, there is one severe limitation in that users can overlook important, complex interactions between causes. Therefore, if a problem is caused by a combination of factors, it is difficult to use this tool to depict and solve the problem. This is something to keep in mind when working with a cause and effect diagram.

Figure 1: Example of Cause and Effect (Fishbone) Diagram

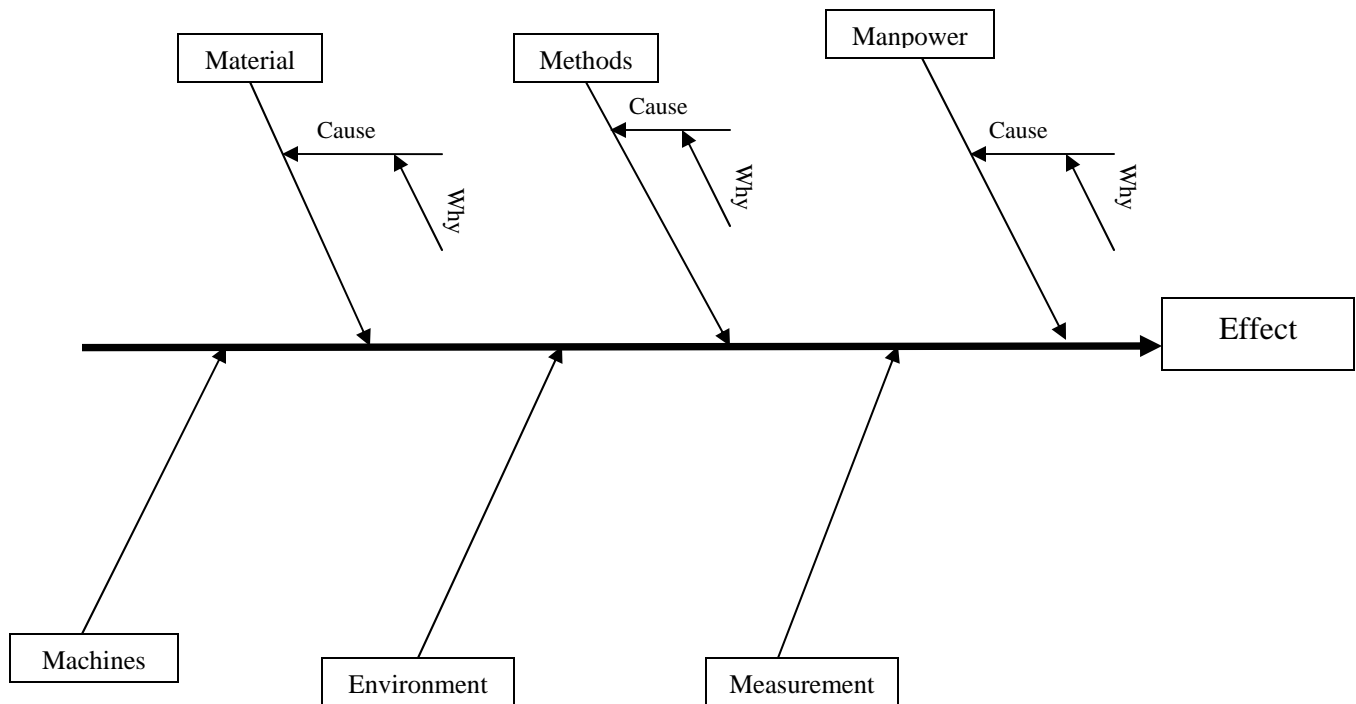


Figure 2: Completed Cause and Effect Diagram (Taken from Trent Improvement Network Website)
This diagram looks at waiting time in a doctor's office.

